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For: COMMUNICATION SYSTEM, EXCHANGE AND
COMMUNICATION HOLDING CONTROL METHOD (Amended)
Art Unit: Not yet assigned
Examiner: Not yet assigned

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

May 14, 1999

Sir:

Prior to examination, please amend the above-identified
application as follows.

IN THE TITLE

Please amend the title of the invention as follows:

--COMMUNICATION SYSTEM, EXCHANGE AND COMMUNICATION HOLDING
CONTROL METHOD--

IN THE SPECIFICATION

Please amend the specification as follows:

Page 13, line 17, delete "multifunctional"; and

line 18, delete "telephone line interface circuit 16₁
to 16_m" insert --extension telephone control devices 14₁ to
14_m--.

09/270,676-03469

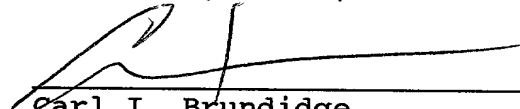
REMARKS

Entry of the above amendments is respectfully requested.

Please charge any shortage in fees due in connection with the filing of this paper, or credit any overpayment of fees, to the deposit account of Antonelli, Terry, Stout & Kraus, LLP, Deposit Account No. 01-2135 (566.37037X00).

Respectfully submitted,

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Declaration

I, Kaoru Tasaka, a national of Japan, c/o Shoyo Naigai Patent Attorneys Office, Yokohama HS-Bldg. 7F, 9-10, Kitasaiwai 2-chome, Nishi-ku, Yokohama-shi, Kanagawa-ken, Japan, declare that I am familiar with both the English and Japanese languages, that I am the translator of the attached document, that to the best of my knowledge and belief the attached document is a true and accurate translation of U.S. Patent Serial No. 09/270,676, entitled COMMUNICATION SYSTEM, EXCHANGE AND COMMUNICATION HOLDING CONTROL METHOD filed on March 16, 1999, and further that these statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 8 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Dated this 10th day of May, 1999



Kaoru Tasaka

COMMUNICATION SYSTEM, EXCHANGE

AND COMMUNICATION HOLDING CONTROL METHOD



BACKGROUND OF THE INVENTION

1. Field of the Invention

5 The present invention relates to a communication system including an exchange and telephones accommodated in the exchange concerned, and particularly to a communication holding control technique for use in a communication system containing a private branch exchange and a plurality of
10 multifunctional telephones accommodated in the private branch exchange.

2. Description of Related Art

 A communication system containing a private branch exchange and a plurality of telephones and multifunctional
15 telephones (telephones having call hold/transfer functions, an abbreviated dialing function, etc.) accommodated in the private branch exchange concerned have been widely popular in working places, etc.

 The following procedure has been used in such a
20 conventional communication system in order to hold a calling partner and to transfer a telephone call from the calling partner.

 Upon pushing a transfer button of a multifunctional telephone, an exchange cuts off a communication path
25 between the multifunctional telephone and an external

telephone and connects both the multifunctional telephone concerned and the external telephone (public line) to a hold tone source to keep the external telephone under communication in a hold state.

5 When the multifunctional telephone accepts an extension number through a dialing operation, the exchange connects the multifunctional telephone to a ring-back tone source and rings a telephone (extension) specified by the extension number and then waits for a response from the
10 telephone.

 Upon receiving the response from the telephone (extension) (that is, when the handset of the telephone is lifted up), the exchange connects the telephone concerned and the multifunctional telephone to each other to
15 establish a communication path therebetween. This state, that is, the state that the present communication partner (public line) is held to make a communication with another communication partner (extension) is hereinafter referred to as "transfer communication".

20 SUMMARY OF THE INVENTION

 In the conventional communication system, it has been impossible to hold a transfer communication partner. That is, only one communication partner under communication can be held for each of the multifunctional telephones
25 accommodated in the private branch exchange. Therefore,

the conventional communication system uses the following procedure when a user of the multifunctional telephone holds a communication partner under communication to perform a transfer communication with another communication partner (first transfer communication partner) and then makes a communication with another communication partner (second transfer communication partner) during the transfer communication with the first transfer communication partner.

First, the operator of the multifunctional telephone requests the operator of the first transfer communication partner through the communication channel between the multifunctional telephone and the first transfer communication partner to hang up, whereby the first transfer communication partner is hanged up.

By the hang-up operation of the first transfer communication partner, the multifunctional telephone returns to the communication with the communication partner under hold. The operator of the multifunctional telephone holds the communication partner again, and then dial the extension number of a desired transfer communication partner (second transfer communication partner) to call the transfer communication partner concerned.

The conventional communication system has the following problems because the above procedure is needed when the operator of the multifunctional telephone holds a communication partner to make a transfer communication with

a first transfer communication partner and then makes a communication with a second transfer communication partner during the transfer communication with the first transfer communication partner.

5 (1) Much time is needed for the operation because the user of the first transfer communication partner is requested to hang up.

(2) It is difficult to judge whether the first transfer communication partner is hanged up.

10 (3) The communication returns to that with the communication partner under hold every time the transfer communication partner is changed (output of a hold tone to the communication partner under hold is stopped), and this causes great confusion.

15 The present invention has been implemented in view of the foregoing circumstances, and has an object to enable the holding operation of a plurality of communication partners for each of telephones accommodated in an exchange.

In order to solve the above problems, according to
20 the present invention, a communication system comprises an exchange and a plurality of telephones accommodated in the exchange, wherein each of the telephones includes hold instruction accept means for accepting a hold instruction of an operator and hold releasing instruction accept means
25 for accepting a hold releasing instruction of the operator, and the exchange includes hold control means for holding,

in accordance with the hold instruction from the telephone under communication, a communication partner of the telephone concerned hold information registration means for registering in a hold information register area information
5 of the communication partner which is held in accordance with the hold instruction from the telephone, and hold release means for searching, in accordance with a hold release instruction from the telephone which holds the communication partner, information of a communication
10 partner specified by the hold release instruction from the hold information registration area and releasing the hold of the communication partner specified by the searched information, thereby connecting the communication partner to the telephone.

15 According to the present invention, information of the communication partner under hold is registered in the hold information registration area, and the hold release processing is carried out on the basis of the hold information registration area. As described above, the
20 information of the communication partner under hold is managed in the hold information registration area, so that each telephone accommodated in the exchange can hold a plurality of communication partners. That is, each telephone can communicate with a communication partner
25 while holding another transfer communication partner.

In the present invention, a plurality of common hold

buttons may be provided as the hold instruction accept means and the hold release instruction accept means, and there may be provided a plurality of display means each of which is provided in association with each of the common
5 hold buttons, accepts a hold instruction and is turned on when the corresponding common hold button is pushed, and accepts a hold release instruction and is turned off when the corresponding common hold button is pushed during the turn-on state thereof.

10 In this case, the hold information registration means associates the information of the communication partner held in accordance with the hold instruction from the telephone with the common hold button accepting the hold instruction concerned to register the information in
15 the hold information registration area.

In accordance with the hold release instruction from the telephone, the hold release means searches from the hold information registration area the information corresponding to the common hold button accepting the hold
20 release instruction, and releases the hold of the communication partner specified by the searched information, thereby connecting the communication partner to the telephone.

BRIEF DESCRIPTION OF THE DRAWINGS

25 Fig. 1 is a diagram showing a communication system

to which an embodiment of the present invention is applied;

Fig. 2 is a diagram showing a panel face of each extension telephone 150₁ to 150_n;

Fig. 3 is a diagram showing a panel face of each multifunctional telephone 170₁ to 170_m;

Fig. 4 is a status transition diagram until a communication path is established between an external telephone 21 and a multifunctional telephone 170₁ in Fig. 1;

Fig. 5 is a status transition diagram until the external telephone 21 is held and then an extension telephone 150₁ is alerted after a communication state (step S103) of Fig. 4;

Fig. 6 is a status transition diagram until extension information of a transfer communication partner (extension telephone 150₁) serving as a hold target is registered in the hold information registration area of a main memory device 13 after an alert state (step S105) of Fig. 5;

Fig. 7 is a status transition diagram until the extension telephone 150₁ under transfer communication is held and another extension telephone 150_n is alerted after the hold information registration processing (step S107) of Fig. 6;

Fig. 8 is a state transition diagram until the extension information of the transfer communication partner

(extension telephone 150_n) serving as a hold target is registered in the hold information registration area of the main memory device 13 after the alerting state (step S109) of Fig. 7; and

5 Fig. 9 is a state transition diagram until the extension telephone 150_n under transfer communication is held and the extension telephone 150_n under hold is alerted to communicate with the extension telephone 150_n after the hold information registration processing (step S111) of Fig.
10 8.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Preferred embodiments according to the present invention will be described hereunder with reference to the accompanying drawings.

15 Fig. 1 is a diagram showing a communication system to which an embodiment of the present invention is applied.

As shown in Fig. 1, the communication system of this embodiment comprises a private branch exchange 1, extension telephones 150₁ to 150_n accommodated in the private branch
20 exchange 1, and multifunctional telephones 170₁ to 170_m having hold/transfer functions which are also accommodated in the private branch exchange 1.

First, the private branch exchange 1 will be described.

25 The private branch exchange 1 includes a switch 10

for switching a communication path to another, line interface circuit (LIN) 14₁ to 14_n for connecting the extension telephones 150₁ to 150_n to the communication channel switch 10 respectively, multifunctional telephone line interface circuit (MLIN) 16₁ to 16_m for connecting the multifunctional telephones 170₁ to 170_m to the switch 10 respectively, central office trunks (COT) 18₁ to 18_k for connecting a public switched telephone network 19 to the switch 10, a central processing equipment (CPE) 12 and a main memory (MEM) 13.

Here, the central processing equipment 12 and the main memory 13 are connected to the switch 10 through a control bus 11. Each external telephone 21 is connected to the public switched telephone network 19.

The main memory 13 stores programs for services such as an exchange work, etc., system established data, control data, a hold information registration area 24 for managing the telephones (the extension telephones 150₁ to 150_n, the multifunctional telephones 170₁ to 170_m) accommodated in the private branch exchange 1 in the communication partners under hold, and a hold registration program 23 for registering extension information of the telephones under hold (the extension telephones 150₁ to 150_n, the multifunctional telephones 170₁ to 170_m) into the hold information registration area 24.

The central processing equipment 12 reads out and

executes the programs stored in the main memory 13 to control each constituent element of the private branch exchange 1 and each telephone accommodated in the private branch exchange 1, and it performs various services such as the exchange work, etc., and hold information registration processing of registering hold information into the hold information registration area 24. The central processing equipment 12 releases the holding of the telephones accommodated in the private branch exchange 1 in the communication partners under hold in accordance with the hold information registration area 24 stored in the main memory 13.

The switch 10 is put under the control of the central processing equipment 12, and the exchange work, the connection/cut-off work, etc. between the office trunks 18_1 to 18_k , the line interface circuit 14_1 to 14_n and the multifunctional telephone line interface circuit 16_1 to 16_m are performed.

The line interface circuit 14_1 to 14_n are put under the control of the central processing equipment 12 to control the call initiation/call reception of the extension telephones 150_1 to 150_n which are respectively connected to the line interface circuit 14_1 to 14_n .

The multifunctional telephone line interface circuit 16_1 to 16_m are put under the control of the central processing equipment 12 to not only control the call

initiation/call reception of the multifunctional telephones 170₁ to 170_m which are respectively connected to the multifunctional telephone line interface circuit 16₁ to 16_m, but also control various services of the multifunctional telephones 170₁ to 170_m such as the transmission of the hold/hold release instructions accepted by common hold buttons 37 (which will be described later) to the central processing equipment 12, display of turn-on/turn-off of the LED (display means) 37a corresponding to each of the common hold buttons 37, etc.

Next, the extension telephones 150₁ to 150_n will be described.

Each of the extension telephones 150₁ to 150_n is basically the same as an analog two-wire type extension telephone which has been hitherto used. In the following description, the detailed description on the internal structure thereof is omitted, and only the construction of the panel face will be described.

Fig. 2 is a diagram showing the panel face of each of the extension telephones 150₁ to 150_n.

Reference numeral 51 represents a dial button which accepts an office station number and an extension number, and reference numeral 52 represents a receiver for communication.

Next, the multifunctional telephones 170₁ to 170_m will be described.

Each of the multifunctional telephones 170₁ to 170_m is an extension telephone which is designed to provide various services such as office line-number automatic transmission, abbreviated dial, hold/transfer, etc. It contains a calculator such as a microcomputer or the like, and provides various services to an operator under the control of the multifunctional telephone line interface circuit 16₁ to 16_m.

Fig. 3 is a diagram showing the panel face of each of the multifunctional telephones 170₁ to 170_m.

Reference numeral 31 represents a display unit for displaying a message, reference numeral 32 represents a hand set for communication, reference numeral 33 represents a speaker, reference numeral 34 represents dial buttons used to accept an office line number and an extension number, reference numeral 35 represents fixed function buttons to provide predetermined services, and reference numeral 36 represents variable function buttons which can change the services to be provided by changing the data registered in the microcomputer or the main memory 13. Each of the variable function buttons 36 is provided with a LED (display means), whereby the communication state can be displayed.

One of the plural fixed function buttons 35 provided onto the panel face is allocated to a call-reception button 38 for displaying "call reception", and another of the

fixed function buttons 35 is allocated to a transfer button used when the external telephone 21 under communication is held/transferred.

Some of the plural variable function buttons 36 provided on the panel face are allocated to the common hold buttons 37. Each of the LEDs 37a allocated to the common hold buttons 37 is turned on in response to a hold instruction when the corresponding common hold button 37 is pushed. Further, each of the LEDs is turned off in response to a hold release instruction when the corresponding common hold button 37 is pushed in the state where the LED 37a is turned on. The common hold button 37 is used to hold/release of the holding of a telephone accommodated in the private branch exchange 1.

The instruction accepted by each button provided onto the panel face is transmitted to the central processing equipment 12 through the multifunctional telephone line interface circuit 16₁ to 16_m or the multifunctional telephone line interface circuit 16₁ to 16_m, and the processing is carried out in accordance with the content of the instruction.

Next, the hold control processing of the communication system of this embodiment will be described with reference to Figs. 4 to 9.

Fig. 4 is a state transition diagram until the communication channel between the external telephone 21 and

the multifunctional telephone 170₁ is established in Fig. 1.

When in a state where both the multifunctional telephone 170₁ and the external telephone 21 are idle (no communication channel is established) (step S101), the
5 external telephone 21 initiates a call to the multifunctional telephone 170₁ and this call is received by any one of the office line trunks 18₁ to 18_k through the public telephone network 19, the central processing equipment 12 detects the call-reception and transmits call
10 reception control information to the multifunctional telephone line interface circuit 16₁ connected to the multifunctional telephone 170₁.

Upon receiving the call-reception control information, the multifunctional telephone line interface
15 circuit 16₁ rings the multifunctional telephone 170₁, and waits until it receives a response from the multifunctional telephone 170₁ (step S102).

When the hand set of the multifunctional telephone 170₁ is lifted up in the response waiting state (step S102),
20 the central processing equipment 12 detects the lift-up of the hand set, and controls the switch 10 to connect the call-receiving one of the central office trunks 18₁ to 18_k to the multifunctional telephone line interface circuit 16₁, whereby the communication channel is established between
25 the external telephone 21 and the multifunctional telephone 17₁ (step S103).

Fig. 5 is a state transition diagram until the external telephone 21 is held to alert the extension telephone 150₁ after the communication state (step S103) shown in Fig. 4.

5 Upon pushing the transfer button 39 of the multifunctional telephone 170₁ in the communication state (step S103) shown in Fig. 4, the central processing equipment 12 detects the pushing of the transfer button 39 to connect the call-receiving one of the central office
10 trunks 18₁ to 18_k to a hold tone source 81 to transmit a hold tone to the external telephone 21. Further, it connects the multifunctional telephone line interface circuit 16₁ to a dialing tone source 82 to transmit dial
15 tone to the multifunctional telephone 170₁, and then waits until the extension number is input through the dial button 34 of the multifunctional telephone 170₁ (step S104).

When the extension number of the extension telephone 150₁ is input to the multifunctional telephone 170₁ through the dial button 34 in the dial waiting state (step S104),
20 the multifunctional telephone line interface circuit 16₁ transmits the extension number information to the central processing equipment 12.

Upon accepting the extension number information, the central processing equipment 12 transmits the call-
25 reception information to the line interface circuit 14₁ connected to the extension telephone 150₁. Further, the

central processing equipment 12 connects the multifunctional telephone line interface circuit 16₁ to an alerting tone source 83 to transmit a ring back tone to the multifunctional telephone 170₁.

5 Upon receiving the call-reception information from the central processing equipment 12, the line interface circuit 14₁ controls the extension telephone 150₁ to ring, and waits until it receives a response from the extension telephone 150₁ (step S105).

10 Fig. 6 is a state transition diagram until the extension information of a transfer communication partner (extension telephone 150₁) serving as a hold target is registered in the hold information registration area 24 of the main memory 13 after the alerting state (step S105)
15 shown in Fig. 5.

When the hand set 52 of the extension telephone 150₁ is lifted up in the alerting state shown in Fig. 5 (step S105), the central processing equipment 12 detects the off-hook of the receiver, and controls the communication
20 channel switch 10 so that the multifunctional telephone line interface circuit 16₁ is connected to the line interface circuit 14₁, whereby the communication path (transfer communication path) is established between the multifunctional telephone 170₁ and the extension telephone
25 150₁ (step S106).

The multifunctional telephone line interface circuit

16₁ controls the display unit 31 of the multifunctional telephone 170₁ to display the information of the extension telephone 150₁ connected to the line interface circuit 14₁ connected thereto, that is, the information of the transfer
5 communication partner.

When any turned-off (idle-state) one of the plural common hold buttons 37 provided onto the panel face of the multifunctional telephone 170₁ is pushed, the central processing equipment 12 executes the hold registration
10 program 23 to register required information in the hold information registration area 24 stored in the main memory 13.

As shown in Fig. 6, the hold information registration area 24 comprises a button information
15 registration area 25 and an extension information registration area 26. In the button information registration area 25, there is beforehand registered information representing the corresponding relationship between the button numbers of the variable function buttons
20 36 allocated to the common hold buttons 37 and the hold Nos (numbers) allocated to the button numbers for each of the multifunctional telephones 170₁ to 170_m. For each hold No, the extension information registration area 26 is provided with an area in which extension information associated with
25 the hold No is stored.

On the basis of the hold registration program 23,

the central processing equipment 12 searches from the
button information registration area 25 the hold No.
associated with the button number of the pushed common hold
button 37 of the multifunctional telephone 170₁, and it
5 registers into the area corresponding to the searched hold
No of the extension information registration area 26 the
extension information of the extension telephone 150₁
(information for specifying the extension number of the
extension telephone 150₁ such as identification information
10 of the line interface circuit 14₁ connected to the
extension telephone 150₁ or the like) which is the transfer
communication partner of the multifunctional telephone 170₁
(step S107).

The central processing equipment 12 turns on the LED
15 37a of the pushed common hold button 37 of the
multifunctional telephone 170₁ to emit green light. Further,
it searches from the button information registration area
25 the multifunctional telephones 170₂ to 170_m having the
common hold buttons 37 of the same button number as the
20 pushed common hold button 37 in the multifunctional
telephone 170₁, and turns on the LEDs 37a of the common
hold buttons 37 of the same button number of the searched
multifunctional telephones 170₂ to 170_m to emit red light.

Fig. 7 is a state transition diagram until the
25 extension telephone 150₁ under transfer communication is
held and another extension telephone 150_n is alerted after

the hold information registration processing (step S107)
shown in Fig. 6.

After the hold information registration processing
(step S107) shown in Fig. 6, the central processing
5 equipment 12 connects to the dialing tone source 82 the
multifunctional telephone line interface circuit 16₁
connected to the multifunctional telephone 170₁ under
transfer communication to transmit a dial tone to the
multifunctional telephone 170₁. Further, it connects to the
10 hold tone source 81 the line interface circuit 14₁
connected to the extension telephone 150₁ of the transfer
communication partner to transmit the hold tone to the
extension telephone 150₁. The central processing equipment
12 waits until the extension number is input to the
15 multifunctional telephone 170₁ through the dial button 34
(step S108). In this state, the hold tone is transmitted
to both the external telephone 21 and the extension
telephone 150₁ (common hold state).

When the extension number of the extension telephone
20 150_n is input to the multifunctional telephone 170₁ through
the dial button 34 in the common hold state (step S108),
the multifunctional telephone line interface circuit 16₁
transmits the extension number information to the central
processing equipment 12.

25 Upon accepting the extension number information, the
central processing equipment 12 transmits the call-

reception information to the line interface circuit 14_n
connected to the extension telephone 150_n. Further, it
connects the multifunctional telephone line interface
circuit 16₁ to the alerting tone source 83 to transmit ring
5 back tone to the multifunctional telephone 170₁.

Upon accepting the call-reception information from
the central processing equipment 12, the line interface
circuit 14_n rings the extension telephone 150_n and waits
until it receives a response from the extension telephone
10 150_n (step S109).

Fig. 8 is a state transition diagram until the
extension information of the transfer communication partner
(extension telephone 150_n) serving as a hold target is
registered into the hold information registration area 24
15 of the main memory 13 after the alerting state (step S109)
shown in Fig. 7.

When the hand set 52 of the extension telephone 150_n
is lifted up in the alerting state (step S109) shown in Fig.
7, the central processing equipment 12 detects the off-hook
20 of the hand set 52, and controls the switch 10 so that the
multifunctional telephone line interface circuit 16₁ is
connected to the line interface circuit 14_n, whereby the
communication path (transfer communication path) between
the multifunctional telephone 170₁ and the extension
25 telephone 150_n is established (step S110).

The multifunctional telephone line interface circuit

16₁ controls the display unit 31 of the multifunctional telephone 170₁ to display the information of the extension telephone 150_n connected to the line interface circuit 14_n connected thereto, that is, the information of the transfer
5 communication partner.

When any one of turned-off (idle state) common hold buttons 37 in the plural common hold buttons 37 provided onto the panel face of the multifunctional telephone 170₁ in the transfer communication state (step S110) is pushed,
10 the central processing equipment 12 executes the hold registration program 23 to register required information in the hold information register area 24 stored in the main memory 13.

On the basis of the hold registration program 23,
15 the central processing equipment 12 searches from the button information registration area 25 the hold No. which is associated with the button number of the pushed common hold button 37 of the multifunctional telephone 170₁, and registers into the area corresponding to the searched hold
20 No. the extension information of the extension telephone 150_n serving as the transfer communication partner of the multifunctional telephone 170₁ (information for specifying the extension of the extension telephone 150_n such as identification information of the line interface circuit
25 14_n connected to the extension telephone 150_n or the like) (step S111).

5 The central processing equipment also turns on the
LED 37a of the pushed common hold button 37 of the
multifunctional telephone 170₁ to emit green light. Further,
it searches from the button information registration area
25 the multifunctional telephones 170₂ to 170_m having the
common hold buttons 37 of the same button number as the
pushed common hold button 37 in the multifunctional
telephone 170₁, and turns on the LEDs 37a of the common
hold buttons 37 of the same button number in the searched
10 multifunctional telephones 170₂ to 170_m to emit red light.

Fig. 9 is a state transition diagram until the
extension telephone 150_n under transfer communication is
held to alert and communicate with the extension telephone
150₁ under hold after the hold information registration
15 processing (step S111) shown in Fig. 8.

After the hold information registration processing
(step S111) shown in Fig. 8, the central processing
equipment 12 connects to the dial tone source 82 the
multifunctional telephone line interface circuit 16₁
20 connected to the multifunctional telephone 170₁ under
transfer communication to transmit dial tone to the
multifunctional telephone 170₁. Further, it connects to the
hold tone source 81 the line interface circuit 14_n
connected to the extension telephone 150_n of the transfer
25 communication partner to transmit the hold tone to the
extension telephone 150_n, and waits until the extension

number is input to the multifunctional telephone 170₁ through the dial button 34 or until the common hold button 37 is pushed while the LED 37a of the multifunctional telephone 170₁ is turned on to emit green light (step S112).

- 5 In this state, the hold tone is transmitted to all the external telephone 21, the extension telephone 150₁ and the extension telephone 150_n (common hold state).

When the extension numbers of the other extension telephones 150₂ to 150_{n-1} are input to the multifunctional
10 telephone 170₁ through the dial button 34 in the common hold state (step S112), the processing is returned to the step S109 to perform the same processing.

On the other hand, when the common hold button 37 whose LED 37a is turned on to emit green light (the common
15 hold button 37 used to hold the extension telephone 150₁) is pushed, the hold registration program 23 is executed to delete required information from the hold information registration area 24 stored in the main memory 13.

The central processing equipment 12 searches from
20 the button information registration area 25 the hold No. associated with the button number of the pushed common hold button 37 of the multifunctional telephone 170₁. Further, the central processing equipment 12 searches the extension information stored in the area corresponding to the
25 searched hold No. in the extension information registration area 26 to deletes the extension information from the area

concerned, and then connects to the multifunctional telephone line interface circuit 16₁ the line interface circuit 14₁ specified by the information concerned (step S113), thereby establishing the communication path

5 (transfer communication path) between the multifunctional telephone 170₁ and the extension telephone 150₁.

Still further, the central processing equipment 12 turns off the LED 37a (emitting green light) of the pushed common hold button 37 of the multifunctional telephone 170₁.

10 In addition, the central processing equipment 12 searches from the button information registration area 25 the multifunctional telephones 170₂ to 170_m having the common hold buttons 37 of the same button number as the pushed common hold button 37 in the multifunctional telephone 170₁,
15 and turns off the LEDs 37a (emitting red light) of the common hold buttons 37 of the same button number of the searched multifunctional telephones 170₂ to 170_m.

The multifunctional telephone line interface circuit 16₁ controls the display unit 31 of the multifunctional
20 telephone 170₁ to display the information of the extension telephone 150₁ connected to the line interface circuit 14₁ connected thereto, that is, the information of the transfer communication partner.

According to this embodiment, as described above,
25 the information of the communication partner (extension telephone) under hold is registered in the hold information

registration area 24, and the hold release processing is carried out on the basis of the hold information registration area 24. Since the information of the hold communication partner (extension telephone) is managed on the basis of the hold information registration area 24 as described above, a plurality of communication partners can be held for each of the telephones accommodated in the private branch exchange 1, that is, it is possible to hold the transfer communication partner and communicate with another partner.

In this embodiment, the hold communication partners to be registered in the hold information registration area 24 are limited to only the telephones accommodated in the private branch exchange 1. However, the present invention is not limited to this mode, and external telephones 21 connected to the public switched telephone network 19 may be registered in the hold information registration area 24. In this case, in each of the multifunctional telephones 170₁ to 170_m, an inherent button number is allocated to each transfer button 39, and the button number allocated to each of the transfer buttons 39 of the multifunctional telephones 170₁ to 170_m and the hold No. corresponding to the button number are registered in advance. In the extension information registration area 26 constituting the hold information registration area 24, the public line information of the external telephone 21 (information to

specify the public line of the external telephone 21 such
as information of central office trunks 18_1 to 18_k connected
to the external telephone 21) may be registered in the area
of the hold No. corresponding to the button number
5 allocated to the transfer button 39.

As described above, according to the present
invention, the communication partner under transfer
communication can be held to make a communication with
another extension (communication partner). Accordingly,
10 the user can communicate with another extension
communication partner without requesting a transfer
communication partner to hang up.

WHAT IS CLAIMED IS:

1 1. A communication system comprising an exchange and a
2 plurality of telephones accommodated in the exchange,
3 wherein:

4 each of said telephones includes:

5 hold instruction accept means for accepting a
6 hold instruction from an operator; and

7 hold releasing instruction accept means for
8 accepting a hold releasing instruction from the operator,
9 and

10 said exchange includes:

11 hold control means for holding, in accordance
12 with the hold instruction from the telephone under
13 communication, a communication partner of the telephone
14 concerned;

15 hold information registration means for
16 registering in a hold information register area information
17 of the communication partner of the telephone which is held
18 in accordance with the hold instruction from the telephone;
19 and

20 hold release means for searching, in
21 accordance with a hold release instruction from the
22 telephone which holds the communication partner,
23 information of a communication partner specified by the
24 hold release instruction from the hold information

25 registration area, and releasing the hold of the
26 communication partner specified by the searched information,
27 thereby connecting the communication partner to the
28 telephone.

1 2. The communication system as claimed in claim 1,
2 wherein:

3 a plurality of common hold buttons are provided as
4 said hold instruction accept means and said hold release
5 instruction accept means, and there are provided a
6 plurality of display means each of which is provided in
7 association with each of the common hold buttons, accepts a
8 hold instruction and is turned on when the corresponding
9 common hold button is pushed, and accepts a hold release
10 instruction and is turned off when the corresponding common
11 hold button is pushed during the turn-on state thereof,
12 wherein said hold information registration means associates
13 the information of the communication partner held in
14 accordance with the hold instruction from the telephone
15 with the common hold button accepting the hold instruction
16 concerned to register the information in the hold
17 information registration area, and

18 said hold release means searches, in accordance with
19 the hold release instruction from the telephone, the
20 information corresponding to the common hold button
21 accepting the hold release instruction from the hold

22 information registration area, and releases the hold of the
23 communication partner specified by the searched information,
24 thereby connecting the communication partner to the
25 telephone.

1 3. An exchange accommodating therein a plurality of
2 telephones each having a hold function, comprising:

3 hold control means for holding a communication
4 partner of a telephone in accordance with a hold
5 instruction from a telephone under communication;

6 hold information registration means for registering
7 in a hold information registration area information of the
8 communication partner of the telephone which is held in
9 accordance with the hold instruction from the telephone;
10 and

11 hold release means for searching in accordance with
12 a hold release instruction from the telephone holding the
13 communication partner the information of the communication
14 partner specified by the hold release instruction from the
15 hold information registration area, releasing the holding
16 of the communication partner specified by the searched
17 information and connecting the communication partner
18 concerned to the telephone.

1 4. A communication hold control method in a
2 communication system comprising an exchange and a plurality

3 of telephones each of which is accommodated in the exchange
4 and has a hold function, comprising:

5 a first step of holding a communication partner of a
6 telephone in accordance with a hold instruction from the
7 telephone under communication;

8 a second step of registering information of the
9 communication partner of the telephone under hold into a
10 hold information registration area; and

11 a third step of searching in accordance with a hold
12 release instruction from the telephone the information of a
13 communication partner specified by the hold release
14 instruction, releasing the holding of the communication
15 partner specified by the searched information and then
16 connecting the communication partner to the telephone,
17 wherein said first, second and third steps are carried out
18 in said exchange, and said first step holds the
19 communication partner of the telephone under communication
20 even when the telephone under communication which outputs
21 the hold instruction has already have a communication
22 partner under hold.

ABSTRACT OF THE DISCLOSURE

Each of multifunctional telephones has a common hold button for accepting a hold/hold release instruction of a communication partner (extension) under transfer

5 communication; a central processing equipment controls each part of a private branch exchange so that the transfer communication partner concerned is held in accordance with a hold instruction from a multifunctional telephone under transfer communication; the information of a hold target

10 (extension) is registered into a hold information registration area; in accordance with a hold release instruction from a multifunctional telephone holding a communication partner, the information of the communication partner specified by the instruction is searched from the

15 hold information registration area; and the holding of the communication partner specified by the searched information is released to connect the communication partner to the multifunctional telephone concerned, whereby the communication partner (extension) under transfer

20 communication can be held to communicate with another extension.

FIG.1

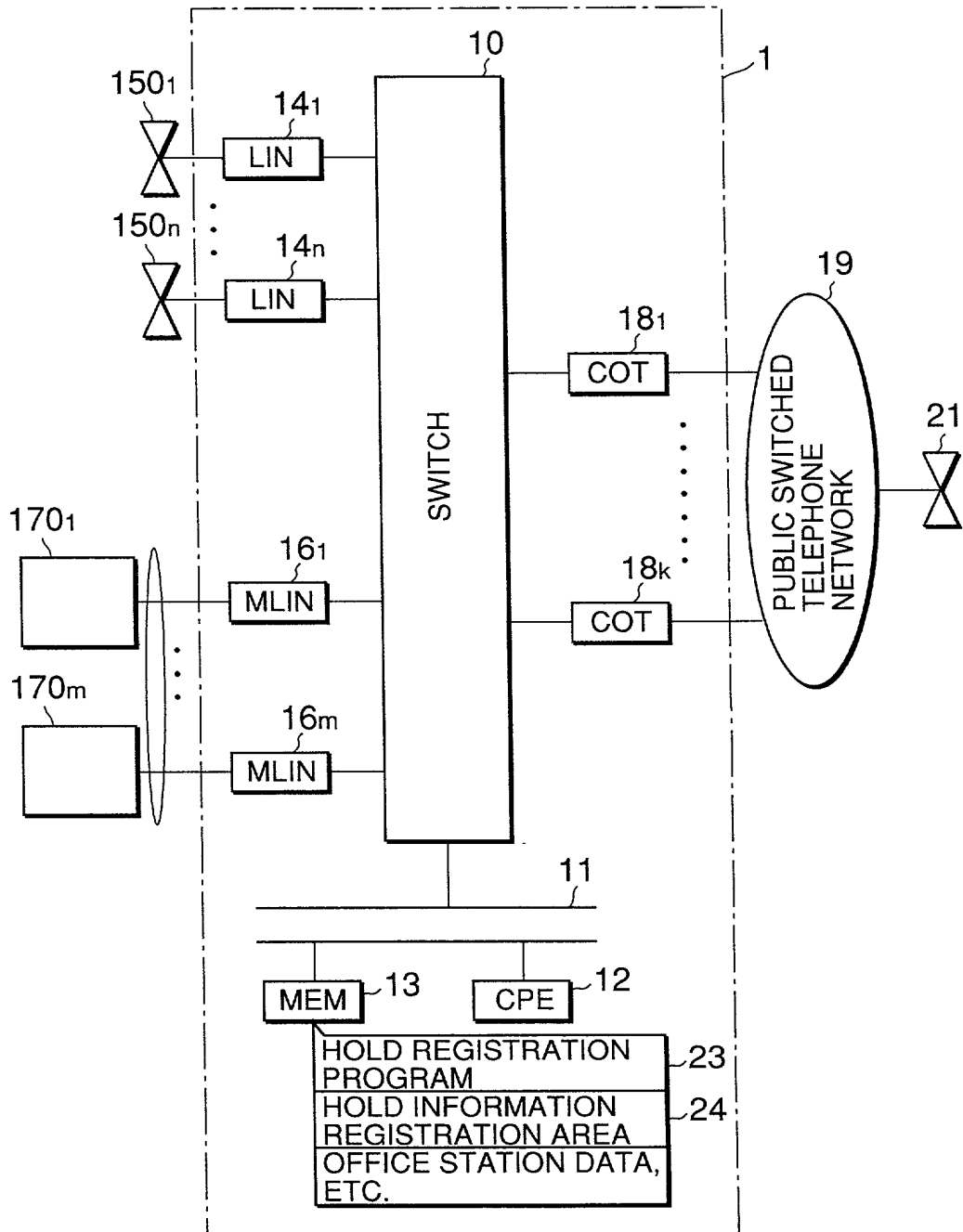


FIG.2

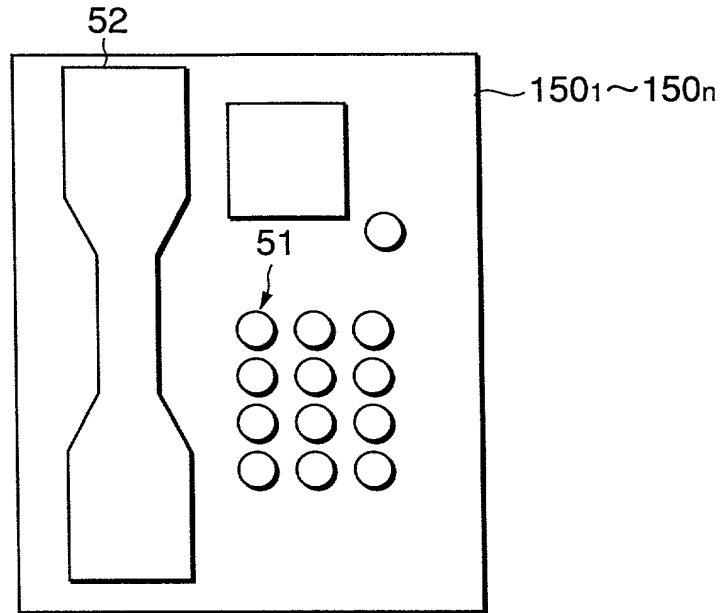


FIG.3

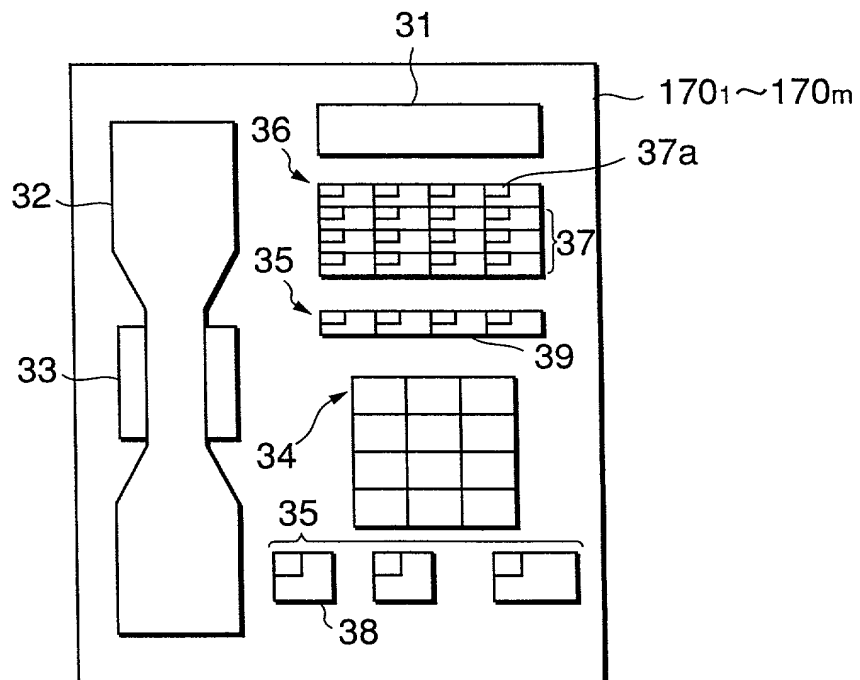


FIG.4

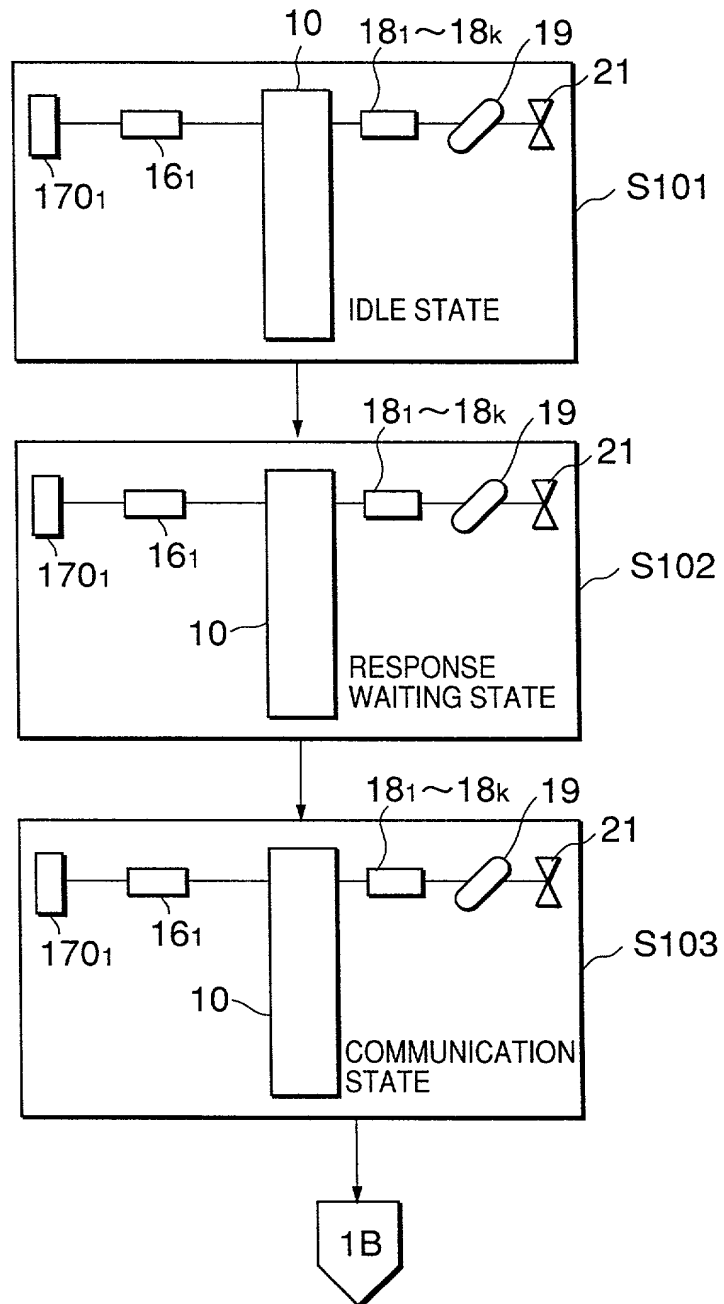


FIG.5

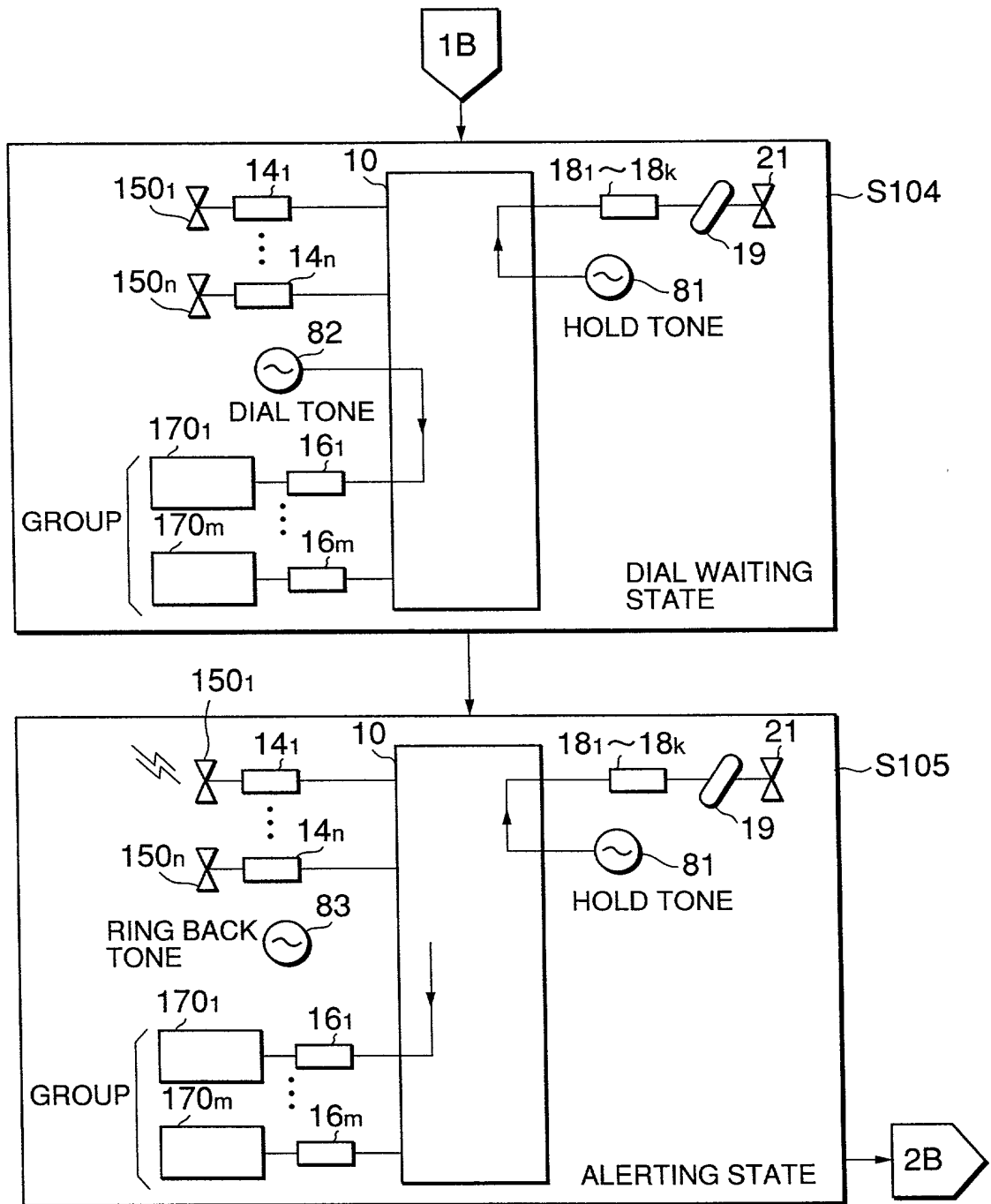


FIG.6

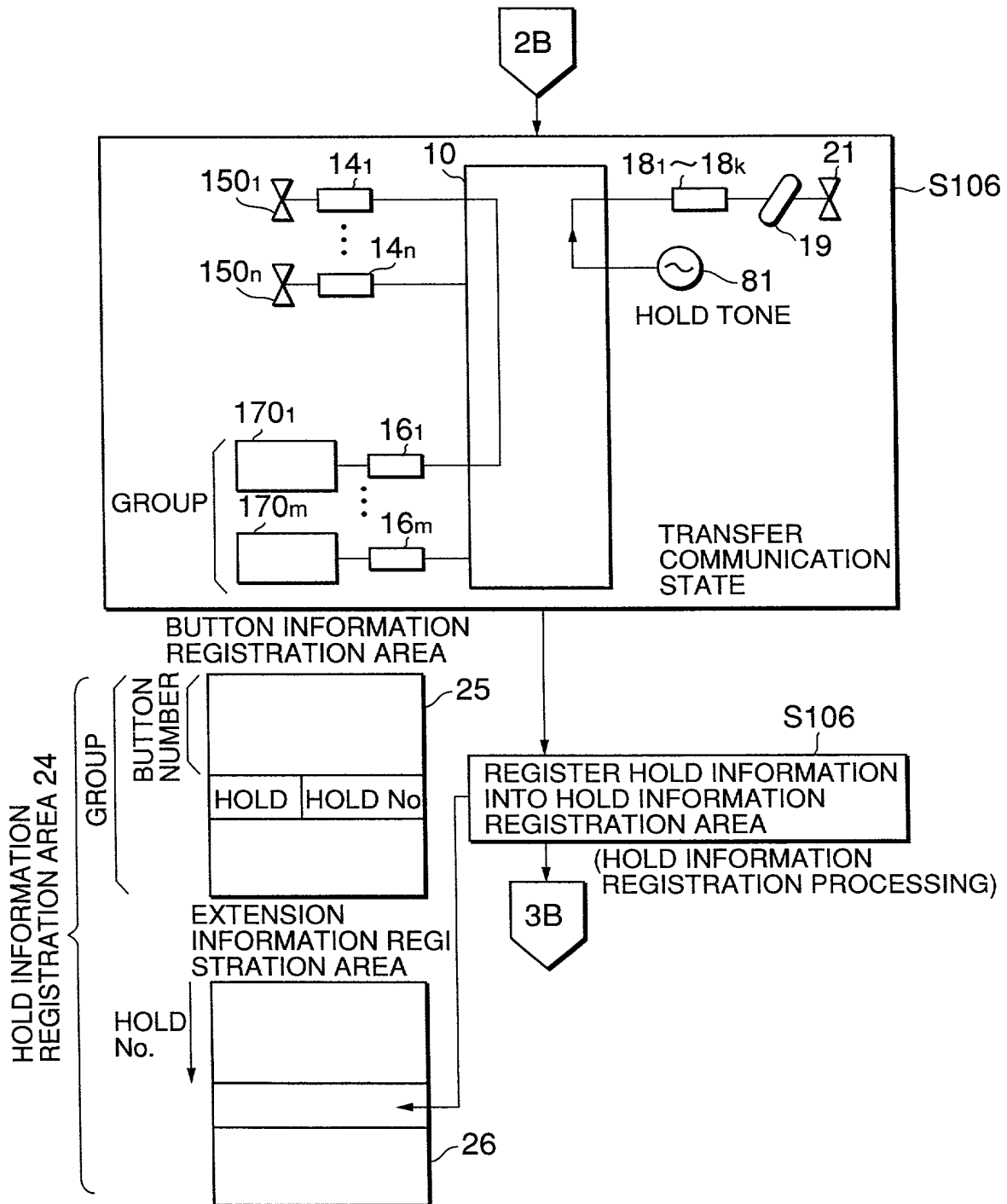


FIG.7

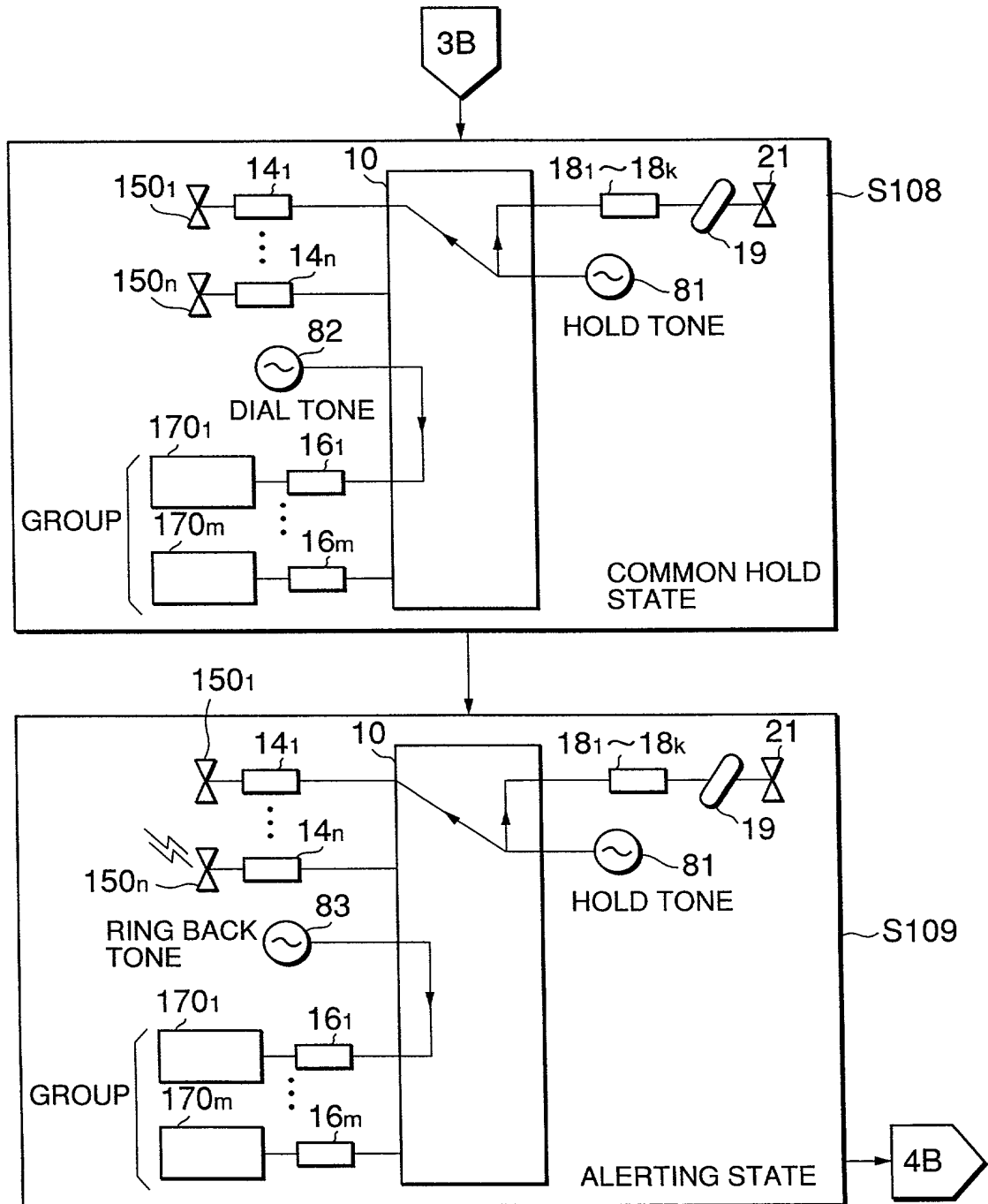


FIG.8

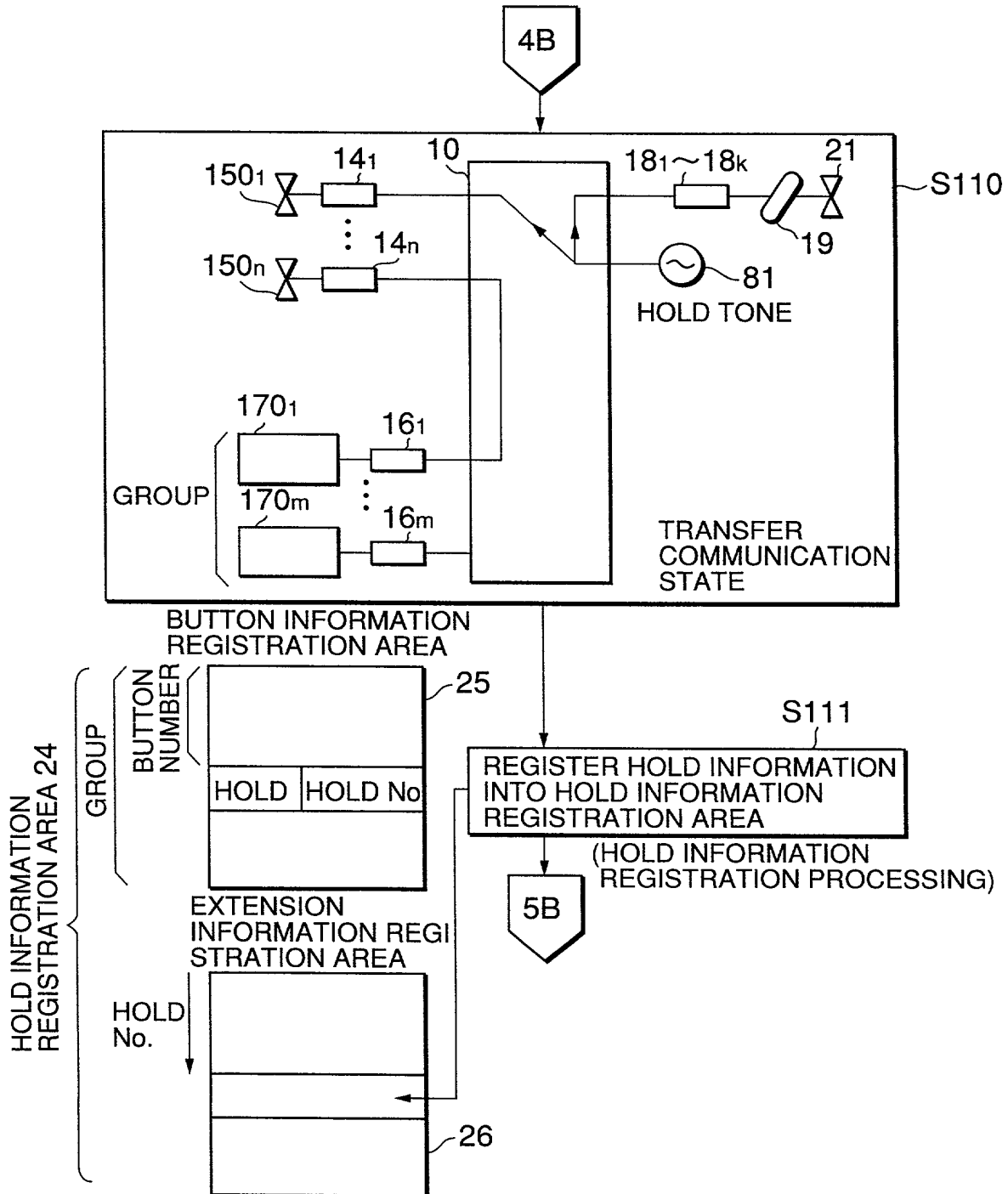
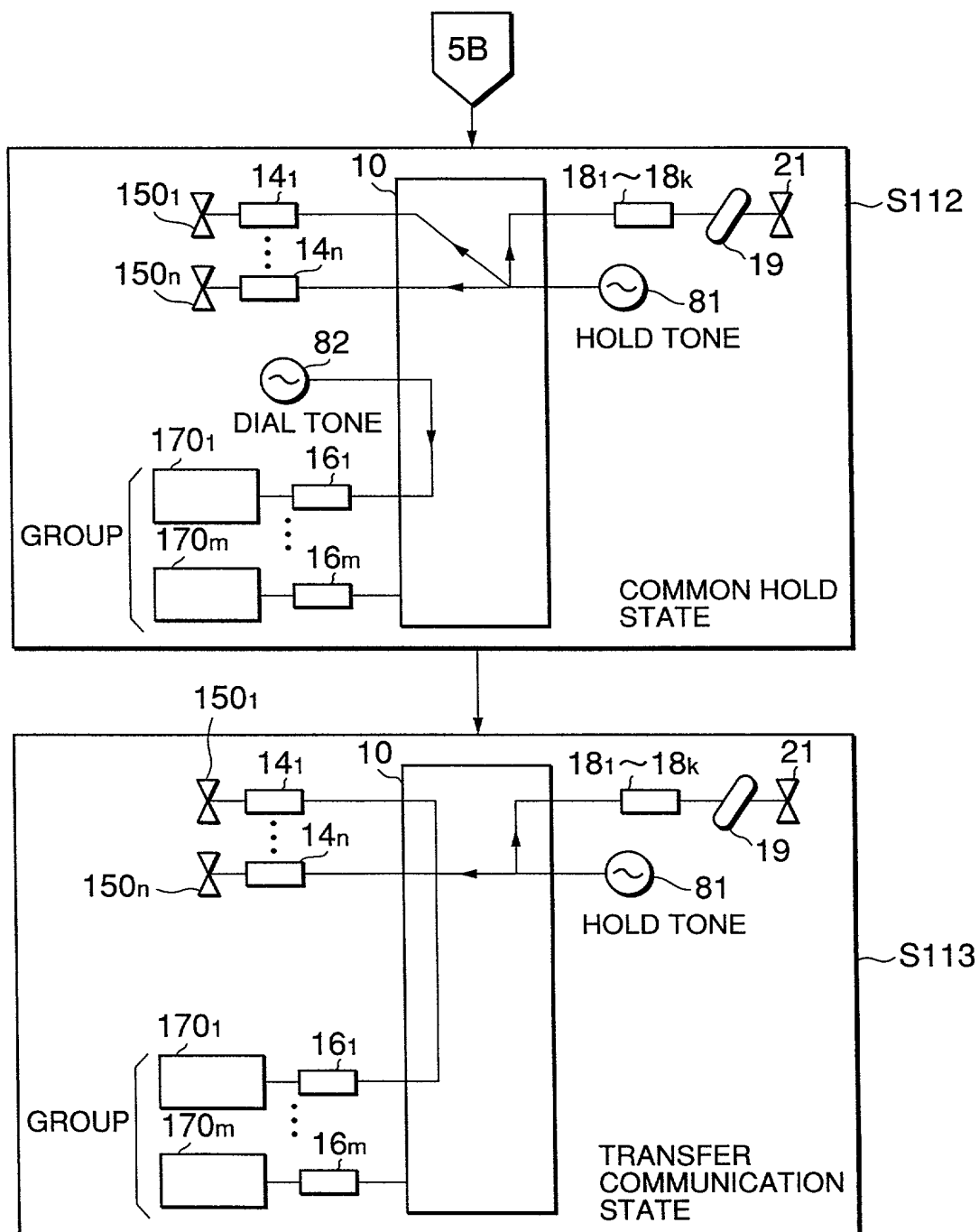


FIG.9





DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name, I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

COMMUNICATION SYSTEM, EXCHANGE AND COMMUNICATION HOLDING CONTROL

METHOD

the specification of which (check one)

☐

is attached hereto.

☒

was filed on March 16, 1999

as Application Serial No. _____

and was amended on _____

(if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, § 1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Codes, § 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)

Priority Claimed

<u>10-065142</u> (Number)	<u>Japan</u> (Country)	<u>16/03/1998</u> (Day/Month/Year filed)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
_____ (Number)	_____ (Country)	_____ (Day/Month/Year filed)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
_____ (Number)	_____ (Country)	_____ (Day/Month/Year filed)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
_____ (Number)	_____ (Country)	_____ (Day/Month/Year filed)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
_____ (Number)	_____ (Country)	_____ (Day/Month/Year filed)	<input type="checkbox"/> Yes	<input type="checkbox"/> No

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, § 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

_____ (Application Serial No.)	_____ (Filing Date)	_____ (Status: patented, pending, abandoned)
_____ (Application Serial No.)	_____ (Filing Date)	_____ (Status: patented, pending, abandoned)
_____ (Application Serial No.)	_____ (Filing Date)	_____ (Status: patented, pending, abandoned)
_____ (Application Serial No.)	_____ (Filing Date)	_____ (Status: patented, pending, abandoned)

(continued on Page 2)

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United State Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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Residence _____ Citizenship _____

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Date _____ Inventor _____

Residence _____ Citizenship _____

Post Office Address _____

Date _____ Inventor _____

Residence _____ Citizenship _____

Post Office Address _____

Date _____ Inventor _____

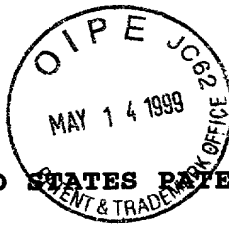
Residence _____ Citizenship _____

Post Office Address _____

Date _____ Inventor _____

Residence _____ Citizenship _____

Post Office Address _____



566.37037X00

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: ABE, et al
Serial No.: 09/270,676
Filing Date: March 16, 1999
For: COMMUNICATION SYSTEM, EXCHANGE AND
COMMUNICATION HOLDING CONTROL METHOD
Art Unit: Not yet assigned
Attention: Box Missing Parts

SUBMISSION OF VERIFIED
ENGLISH TRANSLATION OF SPECIFICATION

Assistant Commissioner
for Patents
Washington, D.C. 20231

May 14, 1999

Sir:

In the matter of the above-identified application, which was originally filed on March 16, 1999 without an English translation of the specification, and responsive to the Notice to File Missing Parts of Application - Filing Date Granted dated April 12, 1999 please find attached hereto a Verified English Translation of the specification for submission in the above-identified application.

A check for the requisite \$130.00 fee is attached. Should any additional fees become due in connection with the filing of this Verified English Translation of the specification, please charge Deposit Account No. 01-2135 (Case No. 566.37037X00).

Respectfully submitted,

Carl I. Brundidge
Registration No. 29,621
ANTONELLI, TERRY, STOUT & KRAUS, LLP

CIB/jdc
Enclosures
703/312-6600

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